OPERATING SUMMARY

ORANGEVILLE

water pollution control plant

1968

ONTARIO WATER RESOURCES COMMISSION

Division of Plant Operations

Water management in Ontario

Ontario
Water Resources
Commission

135 St. Clair Ave. W.
Toronto 7
Ontario

We are pleased to present you with the Operating Summary for the water pollution control facilities operated for you during 1968.

Both the financial and technical information presented should be of assistance to your present and future planning in this important phase of municipal activity.

A new format has been devised to allow greater readability with equally detailed content. We trust that this will meet with your approval.

Our staff wish to express their appreciation for your co-operation throughout the year.

D. S. Caverly,
General Manager.

D. A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

ORANGEVILLE

water pollution control plant

operated for

THE TOWN OF ORANGEVILLE

by the

ONTARIO WATER RESOURCES COMMISSION

1968 ANNUAL OPERATING SUMMARY

FOREWORD

● This operating summary outlines the project's technical capabilities and financial status in 1968. Such information mirrors past and present performance, but a major intention is to anticipate the future -- to solve problems before they occur.

The new format in which this year's data are presented is designed to offer a higher level of readability than in the past, without a corresponding decrease in compactness, accuracy and detail.

Although your Regional Operations Engineer carries the major responsibility for the contents of the report, those involved in its preparation are attached to several Commission sections and divisions. The statistics section of the Division of Plant Operations compiled the information for the graphs and charts. The draughting section of the Division of Sanitary Engineering drew the graphs. The Division of Finance provided all cost data.

Only the close co-operation of these departments allowed the publication of this summary.

CONTENTS

'68 REVIEW

During 1968 the plant capacity was increased. A description of the complete plant operation follows:

INFLUENT WORKS (Existing)

The sewage enters the plant by means of a 30-inch diameter sewer and is coarse-screened. It is then pumped by two raw sewage lift pumps to a grit channel.

PRIMARY SEDIMENTATION TANK (Existing)

The primary sedimentation tank provides enough detention to allow the removal of 30 to 35 percent of the heavy organic material.

Some small modifications to the primary clarifier effluent well were made to ensure that the total flow went to the newly constructed aeration section.

FLOWS

Flows above the design capacity of the plant by-pass the plant and are chlorinated before entering the river.

AERATION TANK

The existing aeration tanks were demolished and two new aeration tanks incorporating the Inka aeration system were installed. The aeration section can now handle flows up to 750,000 gallons per day.

The primary effluent, flowing to the aeration section, is mixed with activated sludge, which is returned from the final sedimentation tanks and aerated.

FINAL SEDIMENTATION TANK

The aerated mixed liquor from the aeration section is retained in the final sedimentation tank for approximately two hours at a flow of 750,000 gallons.

DIGESTION

A new digester building was constructed along with a boiler room. The raw sludge pumped to the digester is heated and recirculated. The digested sludge in the digester is periodically hauled away by truck to a disposal site.

Due to construction during the year, only partial treatment was given for several months. This affected the final results for the year, giving high BOD and suspended solids concentrations. If the data for the last three months are inspected (when full treatment was operational) BOD and suspended solids concentrations in the final effluent were within the Commission's objectives.

PROJECT COSTS

NET CAPITAL COST (Estimated) Long Term Debt to OWRC	$176,332.46
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1968	$ 38,704.88
Net Operating	$ 19,337.78
Debt Retirement	3,558.00
Reserve	787.56
Interest Charged	9,759.54
TOTAL	$ 33,442.88

RESERVE ACCOUNT

Balance at January 1, 1968	$ 9,057.57
Deposited by Municipality	787.56
Interest Earned	553.08
	$ 10,398.21
Less Expenditures	-
Balance at December 31, 1968	$ 10,398.21

EXTENSION -- 2-0208-66

NET CAPITAL COST (Estimated)	$497,320.97
DEDUCT - Portion Financed by CMHC	364,416.00
Long Term Debt to OWRC	$132,904.97

Monthly Operating Costs

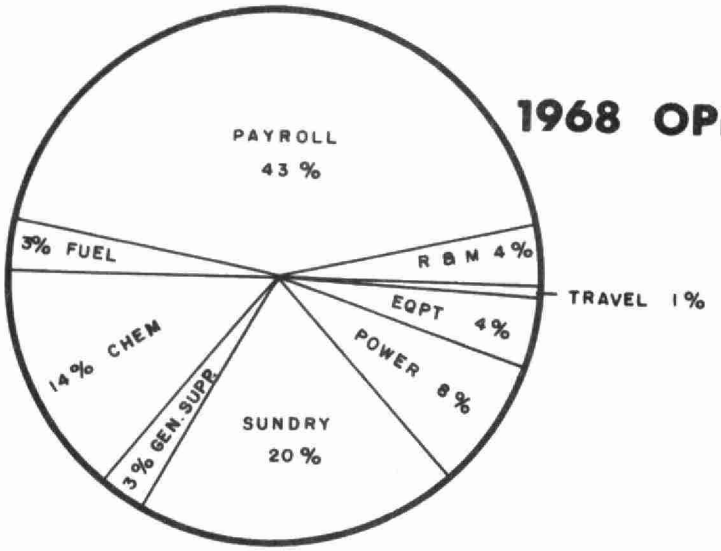
MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAY ROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	* SUNDRY	WATER	TRAVEL
JAN	652.63	524.76	-	-	94.87	-	33.00	-	-	-	-	-
FEB	1500.17	478.78	-	25.30	127.63	477.22	37.38	-	8.26	275.60	-	-
MAR	1303.72	723.96	-	50.44	-	238.61	18.83	-	43.96	227.92	-	-
APRIL	1397.14	498.79	-	26.80	331.61	-	7.00	-	302.81	202.13	-	28.00
MAY	2337.38	450.69	-	-	147.39	238.61	43.08	-	-	1457.61	-	-
JUNE	1334.89	489.17	-	27.17	168.70	276.46	45.29	-	87.93	240.17	-	-
JULY	1310.70	451.14	-	-	108.62	238.62	17.96	34.13	128.00	332.23	-	-
AUG	1246.01	656.57	-	-	-	238.62	26.14	-	16.83	307.85	-	-
SEPT	1334.22	512.72	-	-	94.78	-	18.33	390.70	-	261.74	-	55.95
OCT	1879.51	931.33	-	-	126.63	477.22	43.96	133.40	(57.51)	224.48	-	-
NOV	1995.58	833.30	-	152.58	147.58	238.61	85.80	126.79	-	410.92	-	-
DEC	3045.83	1630.93	249.59	239.27	196.93	238.61	141.25	120.23	135.45	(21.63)	-	115.20
TOTAL	19337.78	8182.14	249.59	521.56	1544.74	2662.59	518.02	805.25	735.73	3919.02	-	199.15

*SUNDRY INCLUDES SLUDGE HAULING COSTS WHICH WERE $2,466.00

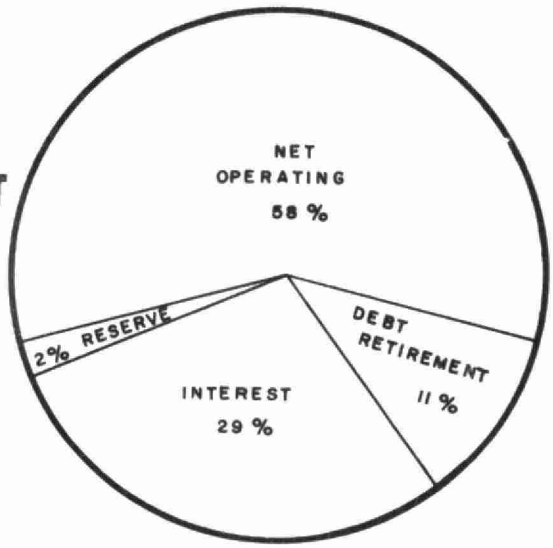
BRACKETS INDICATE CREDIT

cc

1968 OPERATING COSTS



TOTAL ANNUAL COST



Yearly Operating Costs

YEAR	M.G.TREATED	TOTAL COST	COST PER MILLION GALLONS	COST PER LB OF BOD REMOVED
1964	187.373	$13,000.89	$69.38	8 cents
1965	215.853	13,525.19	62.66	6 cents
1966	209.502	14,956.60	71.39	7 cents
1967	240.618	15,203.20	63.18	9 cents
1968	233.14	19,337.78	82.94	8 cents

Process Data

The average daily flow for 1968 was 0. 630 mgd, which is close to the 1967 daily flow of 0. 659 mgd.

The aeration section was out of service for nine months, and as a result, the overall plant efficiency was below normal.

PLANT FLOWS and CHLORINATION

MONTH	TOTAL FLOW mg	AVERAGE DAILY FLOW mg	MAXIMUM DAILY FLOW mg	MINIMUM DAILY FLOW mg	CHLORINE USED 10^3 lbs.	DOSAGE mg/l
JAN	17.65	.569	.862	.468	1.44	8.2
FEB	19.50	.672	1.065	.496	1.36	.70
MAR	27.00	.774	1.037	.462	1.38	5.7
APR	22.32	.744	1.17	.528	1.37	6.2
MAY	18.39	.593	.875	.512	1.41	7.6
JUN	14.22	.474	.574	.226	1.30	9.1
JUL	13.55	.437	.560	.360	1.38	10.1
AUG	16.08	.519	.835	.370	1.42	8.8
SEPT	19.47	.649	.852	.540	1.42	7.3
OCT	20.17	.650	.900	.553	1.31	6.5
NOV	21.23	.708	.979	.538	1.45	6.8
DEC	26.56	.857	.976	.711	1.28	4.8
TOTAL	233.14	-	-	-	16.52	-
AVERAGE	-	.630	-	-	1.37	7.0

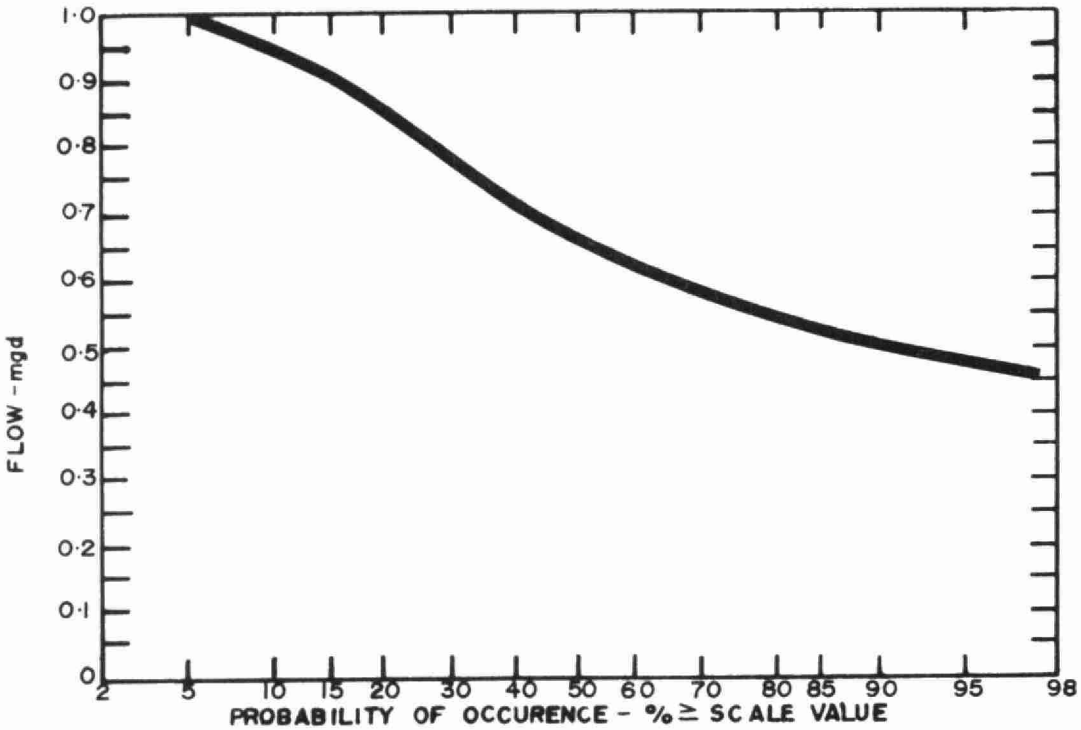
COMMENTS

The average daily flow for 1968 was 0.630 mgd, a decrease of 4.4% from 1967.

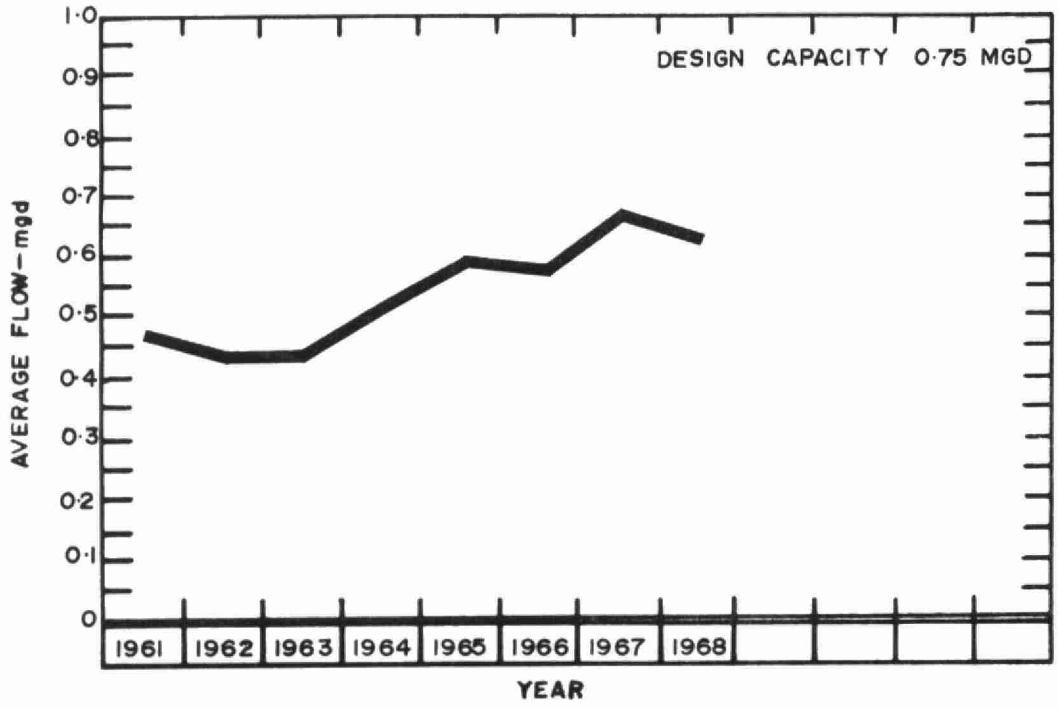
Again in 1968 high concentrations in BOD and suspended solids in the effluent required a chlorine feed rate to the effluent of 7.0 mg/l.

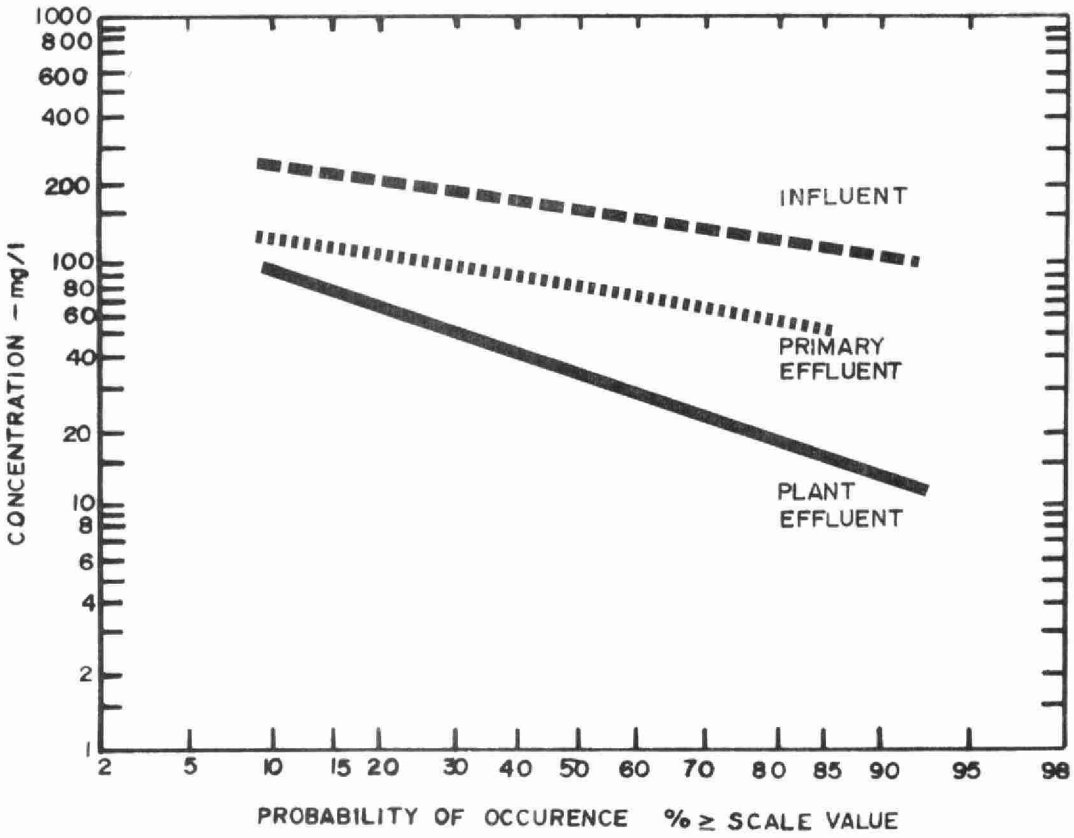
This dosage maintained a 1.0 mg/l chlorine residual after 15 minutes' contact time.

The bacteria count in the effluent was reduced to minute numbers.

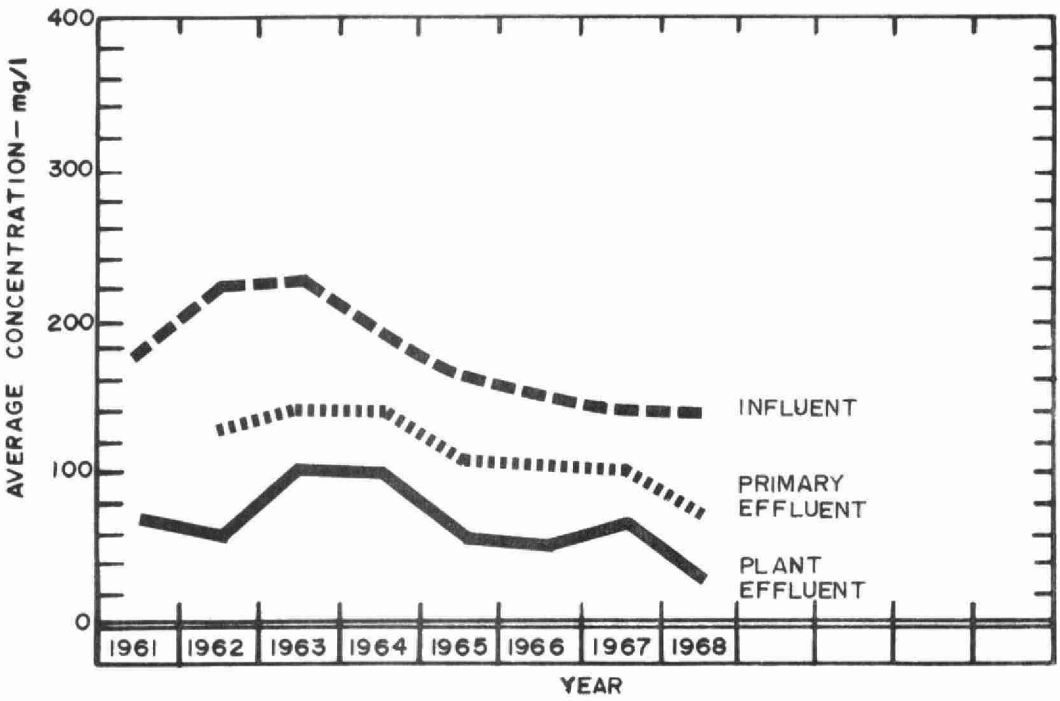

1·0
0·9
0·8
0·7
0·6
0·5
0·4
0·3
0·2
0·1
0
FLOW - mgd
2
5
10
15
20
30
40
50
60
70
80
85
90
95
98
PROBABILITY OF OCCURENCE - % ≥ SCALE VALUE

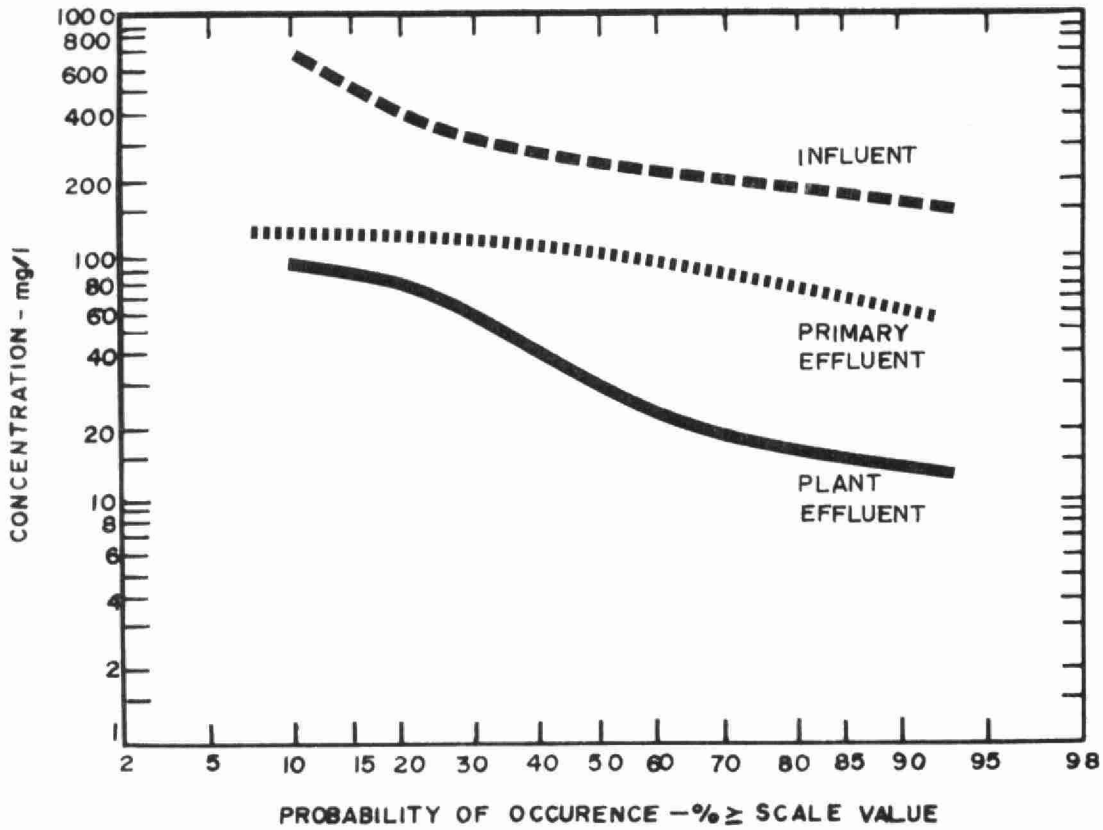
FLOWS


1·0
0·9
0·8
0·7
0·6
0·5
0·4
0·3
0·2
0·1
0
AVERAGE FLOW - mgd
DESIGN CAPACITY 0·75 MGD
1961
1962
1963
1964
1965
1966
1967
1968
YEAR

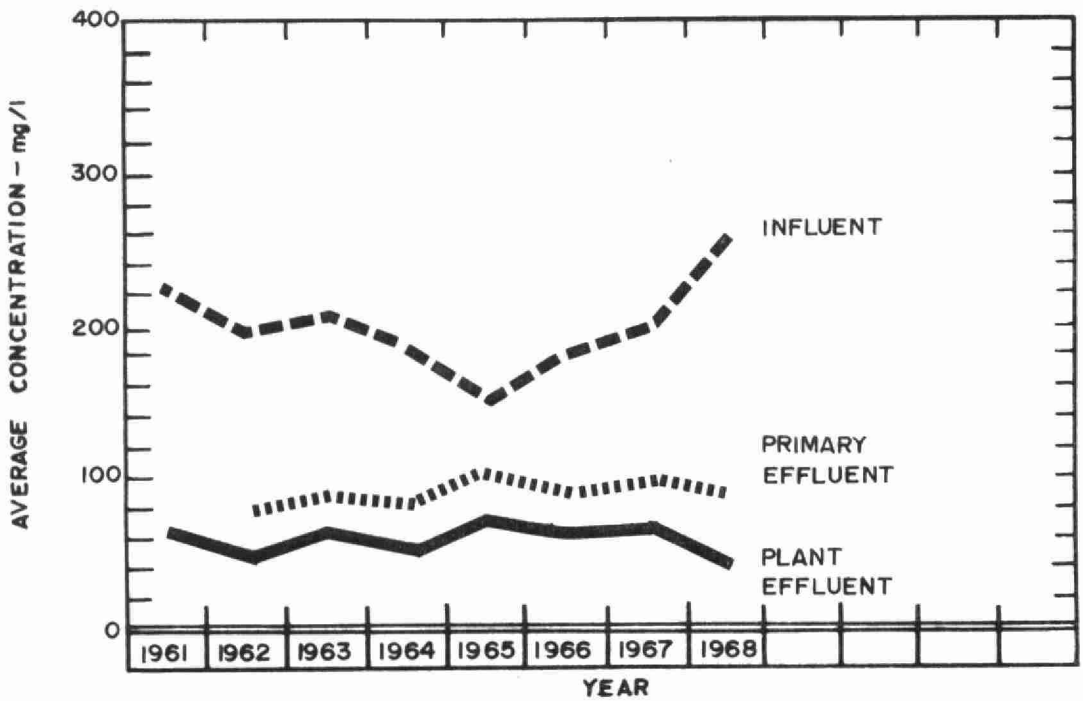


BIOCHEMICAL OXYGEN DEMAND





SUSPENDED SOLIDS



PLANT EFFICIENCY

MONTH	BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				GRIT
	INF CONC^N mg/l	EFF CONC^N mg/l	RED^N %	REMOVAL 10^3 lb	INF CONC^N mg/l	EFF CONC^N mg/l	RED^N %	REMOVAL 10^3 lb	REMOVAL ft^3
JAN	138	77	44	-	143	87	39	-	72
FEB	230	60	74	-	602	78	87	-	-
MAR	96	43	55	12.7	103	38	63	15.6	-
APR	-	-	-	-	-	-	-	-	-
MAY	-	-	-	-	-	-	-	-	88
JUN	-	-	-	-	-	-	-	-	48
JULY	-	-	-	-	-	-	-	-	12
AUG	-	-	-	-	-	-	-	-	112
SEPT	-	-	-	-	-	-	-	-	56
OCT	180	18	90	32.7	252	16	94	47.6	56
NOV	127	14	89	24.0	185	14	92	36.3	8
DEC	90	5	94	22.6	270	10	96	69.1	170
TOTAL	-	-	-	-	-	-	-	-	-
AVERAGE	144	36	75	23.0	259	41	84	34.6	67

COMMENTS

The reduction in BOD and suspended solids averaged 75% and 94% respectively. This is misleading, because the aeration section was not in use until October. If only the last three months are considered, the reduction in BOD and suspended solids averaged 90.9% and 91.5% respectively, which is more representative of the plant's efficiency.

Again, considering the last three months, the plant effluent has come within the Commission's objectives.

The amount of grit removed was increased from 31 cubic feet per month to 69 cubic feet per month.

AERATION

MONTH	AVERAGE FLOW mgd	PRIMARY EFF BOD CONC^N mg/l	PRIMARY EFF SS CONC^N mg/l	SECONDARY EFF BOD CONC^N mg/l	SECONDARY EFF SS CONC^N mg/l	ML SS CONC^N mg/l	F/M $\left(\frac{\text{lb BOD}}{\text{lb ML SS}}\right)$	AIR USED $\left(\frac{\text{1000 ft}^3}{\text{lb BOD REMOVED}}\right)$	WASTE SLUDGE lb
JAN									
FEB									
MAR									
APRIL									
MAY									
JUN									
JUL									
AUG									
SEPT									
OCT	.650	107	107	16	21	4200	.08	7.8	-
NOV	.708	76	108	19	13	1210	.11	11.4	-
DEC	.857	45	60	9	5	2120	.05	14.9	-
TOTAL	-	-	-	-	-	-	-	-	-
AVERAGE	.630	76	91	15	13	2510	.08	11.4	-

COMMENTS

Due to the construction at the plant, tabulation of the above information from January through September was unavailable.

From October through December, the total flow was treated in the aeration section. Reductions in BOD and suspended solids were 80.3% and 85.7% respectively.

SLUDGE DIGESTION and DISPOSAL

MONTH	RAW SLUDGE			DIGESTED SLUDGE			SUPERNATANT		SLUDGE DISPOSAL	
	VOLUME 10^3 gal	T. S. %	V.S. %	VOLUME gal	T. S. %	V.S. %	VOLUME 10^3 gal	T. S. %	LIQUID yd^3	DEWATERED yd^3
JAN	29.0	-	-	-	-	-	-	-	172	-
FEB	21.0	-	-	-	-	-	-	-	125	-
MAR	21.0	-	-	-	-	-	-	-	125	-
APR	31.2	-	-	-	-	-	-	-	185	-
MAY	25.1	-	-	-	-	-	-	-	149	-
JUN	29.1	-	-	-	-	-	-	-	173	-
JUL	32.4	-	-	-	-	-	-	-	192	-
AUG	27.3	-	-	-	-	-	-	-	162	-
SEPT	22.1	-	-	-	-	-	-	-	131	-
OCT	26.6	-	-	-	-	-	-	-	158	-
NOV	46.2	-	-	0	-	-	35.6	-	36	-
DEC	64.8	-	-	0	-	-	64.8	-	0	-
TOTAL	654.4	-	-	-	-	-	100.4	-	1608	-
AVERAGE	54.5	-	-	-	-	-	50.2	-	146	-

COMMENTS

Raw sludge is pumped to a large unheated tank where it is thickened and then removed by tank truck.

Being used as a thickening tank, the tank was effective in giving a 54.8% reduction in solids volume.

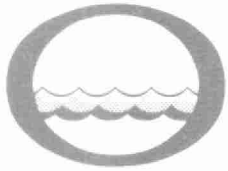
CONCLUSIONS

The addition of the new aeration section has greatly improved the quality of the effluent.

It should be noted that the plant is approaching its capacity of 0.75 mgd .

RECOMMENDATIONS

Steps should be undertaken to have the plant enlarged within three years.



Water management in Ontario